



PROGRESS OF CONSTRUCTION



SASKATCHEWAN RIVER DAM



REPORT NO.1
1958-1961



RT. HON. JOHN G. DIEFENBAKER
Prime Minister of Canada



foreword

A thunderous roar, a cloud of smoke, dirt and water shot skyward. On May 27, 1959, Prime Minister John G. Diefenbaker triggered a dynamite blast that heralded the official start of construction of the South Saskatchewan River Dam, as 14,000 people looked on.

The Dam is the key structure in long-range plans for the complete harnessing of the South Saskatchewan River. It will provide water for hydro electric power, irrigation and recreation, as well as for other agricultural and domestic uses. It will also provide control of flow, minimize severe fluctuations and thus control flooding, and make water available for further power development downstream.

The Dam is being built under the supervision of the Prairie Farm Rehabilitation Administration, a branch of the Federal Department of Agriculture. It is a joint project involving Canada and the Province of Saskatchewan, with the responsibilities of both parties designated in an agreement completed on July 25, 1958. Participation by the Federal Government is mainly associated with the job of harnessing the water resources in the river through the provision of adequate storage and river regulation. The Province is responsible for all facets of development associated with making beneficial use of the water once control has been achieved.

Specifically, the agreement provides that Canada will create the reservoir by building the main dam on the South Saskatchewan River, and a second large dam in the Qu'Appelle Valley, with such related works as are necessary to complete the creation of the reservoir. Canada and Saskatchewan will share in the cost of such construction, 75 per cent of the cost to be borne by Canada, and 25 per cent to be borne by Saskatchewan, provided that Saskatchewan's share shall not exceed 25 million dollars. Upon completion, Canada is to maintain the works for a period of 10 years, and shall be responsible for the cost of such maintenance for a period of six years. During the remaining four years, the cost is to be shared equally.

The agreement also stipulates that when Saskatchewan proceeds with the construction of hydro electric power facilities, the cost of these is to be borne by Saskatchewan provided that Canada will contribute 25 per cent of the cost of constructing and installing such penstocks as may be necessary to produce 200,000 horse power at minimum operating head.

The agreement also provides that Saskatchewan will assume full responsibility for, and undertake the construction, operation and maintenance of all the irrigation works required for the conveyance and distribution of water to all lands to be irrigated by the reservoir.

The estimated cost of the main dam and reservoir is 96 million dollars. The cost of the power plant when full development is attained is expected to be about 50 million dollars, while the cost of irrigation will probably be another 50 million dollars. The irrigation costs will be spread over more than a decade as development in that field will not be as rapid as the power and recreation resources. It is expected that the Dam will be completed by the fall of 1965.

history

AN EARLY VIEW

The dream of damming the South Saskatchewan River has persisted in one form or another for 100 years. In 1857 the British Government sent an expedition under Captain Palliser to explore Western Canada. In 1858 the Government of Canada sent an expedition under Professor H. Y. Hind of Trinity College to explore the Assiniboine and Saskatchewan River Valleys. Both of these explorers noted the close interrelationship existing between the valley of the South Saskatchewan and the Qu'Appelle lake and river system.

Palliser's observations concerning the interrelationship of the two valleys led him to suggest the feasibility of a navigable route connecting the two. Hind went on to suggest the construction of a dam across the South Saskatchewan to divert its waters down the Qu'Appelle Valley.

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This early concept of a navigable route was short lived because, with the completion of the Canadian Pacific Railway's transcontinental line in 1885, a water route to the west was no longer important.

URBAN AREAS EXPAND

Shortly after the turn of the 20th Century, it was apparent that the fast-growing urban centers of Regina and Moose Jaw, along with a number of smaller communities, must do something to supplement their meager water supply. Once again a dam across the South Saskatchewan was proposed.

DROUGHT

From time to time various groups made representations in support of building a dam across the South Saskatchewan. The parching heat and lack of water of the 30's stimulated anew the desire of prairie people to overcome the acute water shortage. This time they were determined that the river be developed as a source of water supply.

TIME TO INVESTIGATE

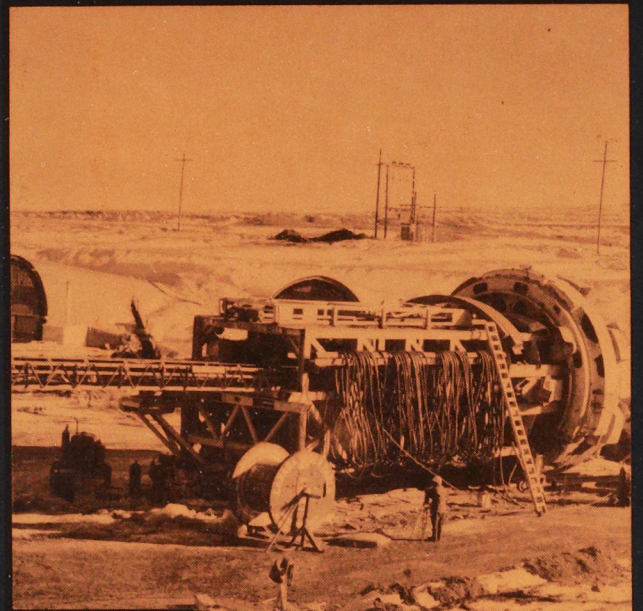
The clamor for action grew stronger until in 1943 the Prairie Farm Rehabilitation Administration was instructed to carry out surveys to determine the feasibility of constructing a dam on the South Saskatchewan for the purpose of irrigation and water conservation. In 1947, a report was issued declaring the feasibility of constructing a dam at the present location, and providing an estimate of the cost with a description of the benefits.

TIME TO ACT

In 1958, the Governments of Canada and Saskatchewan agreed to proceed with the project, and a dream of the past became the hope for the future.



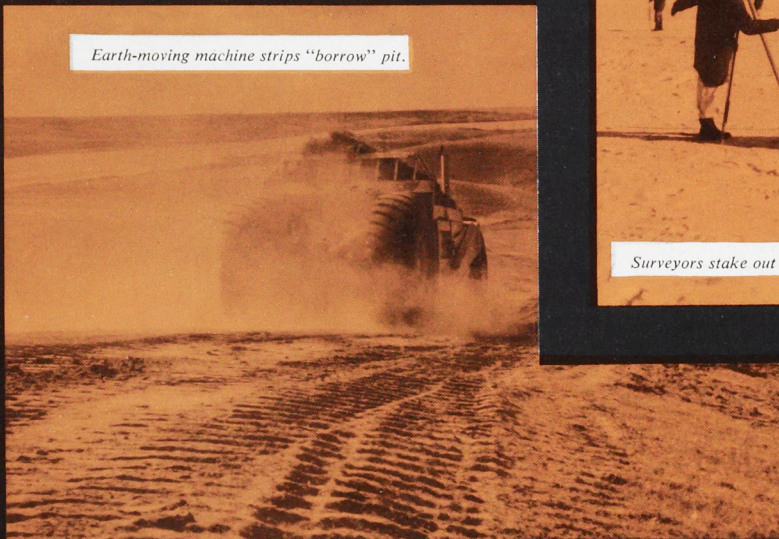
Erecting construction bridge.



"Mole" moves into portal to begin tunnelling.



Earth-moving machine strips "borrow" pit.



Surveyors stake out construction areas.



Sand dredged and pumped to east embankment.



Model of dam at Tourist Pavilion.



Workman vibrating air from concrete in diversion tunnel wall.

progress of construction

The South Saskatchewan River Dam will be the largest earth dam in Canada, and will rank as one of the largest of its type in the world. Together with the dam in the Qu'Appelle Valley it will create a reservoir 140 miles long, with a shoreline of about 475 miles. Associated with creation of the reservoir will be the subsequent need to relocate highways, railroads and bridges that would otherwise be flooded by the rise of water in the reservoir.

The signing of the agreement between the Federal and Provincial Governments meant that work could begin on what will be one of the largest construction jobs ever attempted in Western Canada.

The Dam will rise 210 feet above the bed of the river, and will reach across the valley for a distance of almost three miles. Five diversion tunnels are being driven through the west abutment to carry the flow of the river during the final stages of construction when the river channel will be blocked off. They will later be used to deliver water to the power generating plant to be constructed by the Saskatchewan Power Corporation. These concrete-lined tunnels will have an average length of 4,300 feet, and will have an inside diameter of 20 feet.

A spillway will be required to pass flood flows. It will be of concrete construction, and will be located on the west bank of the river. The location makes use of a natural depression created by Coteau Creek which flows into the South Saskatchewan River just below the Dam. The spillway will be 3,830 feet long with an inlet channel about 8,000 feet long, and an outlet channel about 6,000 feet long. It is designed to carry the highest anticipated flood flows.

In addition to the South Saskatchewan River Dam, another large dam 90 feet high and 9,000 feet long will be built at the head of the Qu'Appelle Valley 12 miles southeast of Elbow. It will be known as the Qu'Appelle Valley dam and will prevent the escape of water from the reservoir into the Qu'Appelle Valley.

Up to April, 1961, twenty-three contracts, totalling \$42.5 million, had been awarded by P.F.R.A. in connection with the South Saskatchewan River Dam. Fifteen of the contracts were completed by this date.

Saskatchewan has awarded two contracts in the amount of two million dollars.

From July to December, 1958, most of the time was spent in preparing for actual construction of the Dam. Preliminary site development was the first consideration. The initial requirement was the provision of an access road into the Damsite. This road was built from provincial Highway No. 19 directly west to the site, a distance of approximately 13 miles. Work on this contract commenced on September 5, 1958, and was completed three and a half months later.

Even before this access road was completed, work had begun on other contracts. A gravel processing and stockpiling contract for 840,000 tons of gravel got under way in November.

Construction of headquarters buildings and housing for administrative personnel was started promptly. Carpenters and other trades worked through the winter constructing roads, sidewalks, sewers, water services and buildings.

In mid-December work started on the piers of the construction bridge which would make possible the movement of equipment and supplies across the river.

The first contract for earth-moving was awarded on the last day of 1958, and work started in the spring of 1959. This contract entailed the excavation of 7,500,000 cubic yards of earth, and the compaction of 5,800,000 cubic yards of material in the Dam. This embankment rises to about half the full height of the Dam, and is located on the east side of the river.

Another access road was built northward to connect with No. 15 Highway at Broderick. It was started early in 1959 and completed in the summer of the same year.

With the piers of the construction bridge well advanced, a contract was let in May, 1959, for the steelwork and deck of the bridge, and work started almost immediately.

During the first year, the largest contract awarded was for the second stage of earth moving, which would take place on the west side of the river. It involved 18,000,000 cubic yards of excavation, and 14,000,000 cubic yards of compacted embankment. This contract required the raising of the west side of the Dam to about half its full height.

Other contracts involving the construction of a well-point water supply system for the benefit of the headquarters area, and the supply of pumping units to operate it were awarded during the initial year.

A pavilion was built late in 1959 for tourists viewing the work from a vantage point high up on the east bank of the river. The pavilion also houses models and displays depicting various phases of the project. Picnic facilities have also been provided on the east side of the river for the benefit of visitors.

FIRST YEAR

Tourist traffic was heavy during the early stages of development, but nowhere near the figure for the summer of 1960, when about 82,000 people visited the site.

Early in 1960, the first contract for tunnels was awarded. It was for the construction of the downstream half of the five tunnels that will carry the flow of the river while the final stages of dam construction are proceeding. These tunnels will later deliver water to the power plant.

Two contracts for material required in construction of the tunnels were let. In December of 1959, a contract was awarded for the supply of 5,500 steel ring beams to be used in bracing the tunnel walls. In July of 1960, a contract for the supply of a special cement for use in construction of the tunnel portals was signed.

Two highways in the area will be flooded as the reservoir fills upon completion of the Dam. This necessitated relocation of these roads. Contracts were let to change No. 45 Highway north from Birsay to the west side of the Dam, a distance of 15 miles. On No. 19 Highway from Elbow to No. 42 Highway, it was also necessary to relocate 25½ miles of road.

SECOND YEAR

In dollar volume of contracts, the third year will be the biggest. The two largest contracts yet awarded received the go-ahead during March 1961, and their total value approaches \$17 million.

One is for construction of the upstream portion of the diversion tunnels. The other is for the third stage of earth moving, a job which will see Coteau Creek dammed off, and excavation for the spillway well advanced.

Work continued through the winter of 1960-61 on a contract to provide a drainage system in the downstream toe of the Dam.

A contract was also awarded for cement with which to line the tunnels. When they are completed, it will be possible for the Saskatchewan Power Corporation to proceed with the development of power installations. Initially, only three of the five tunnels will be used.

The supply of steel plate for lining the tunnels was the first contract let by the Saskatchewan Power Corporation. The contract involves 6,100 tons of plate. Another contract was for the fabrication and delivery of the plate. This contract will see the plates welded together to form 6,000 feet of liner.

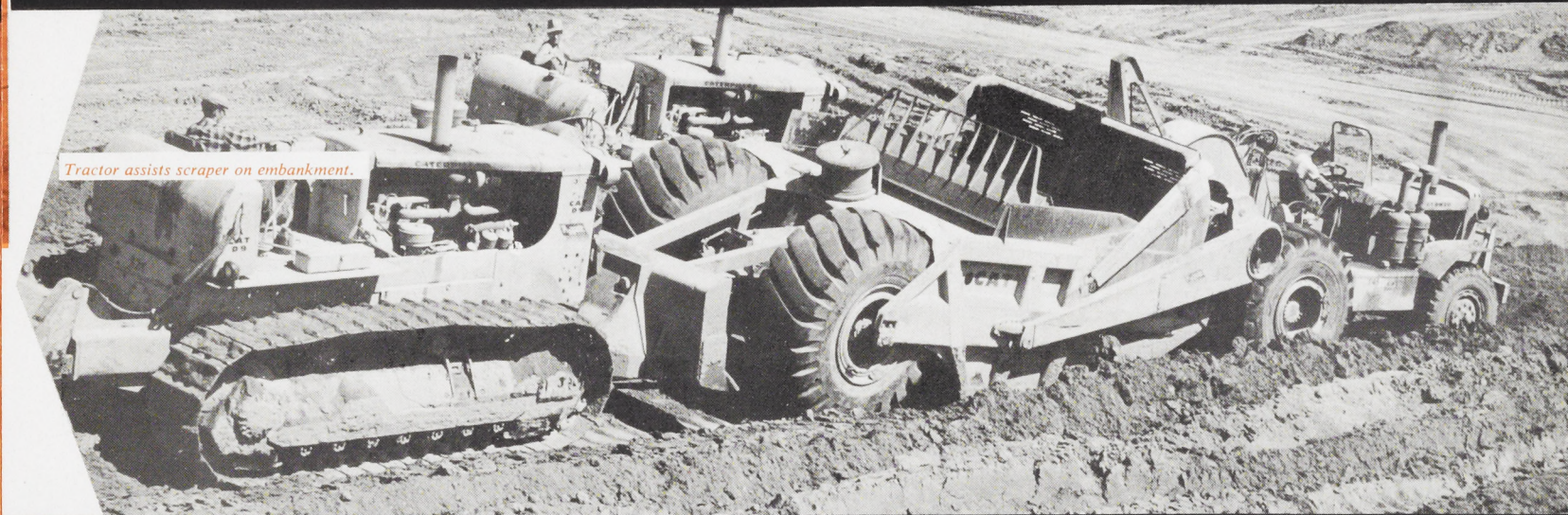
To date, construction of the Dam is on schedule, and 1965 is still considered the target date for completion.

THIRD YEAR

Earth-moving equipment crossing construction bridge.

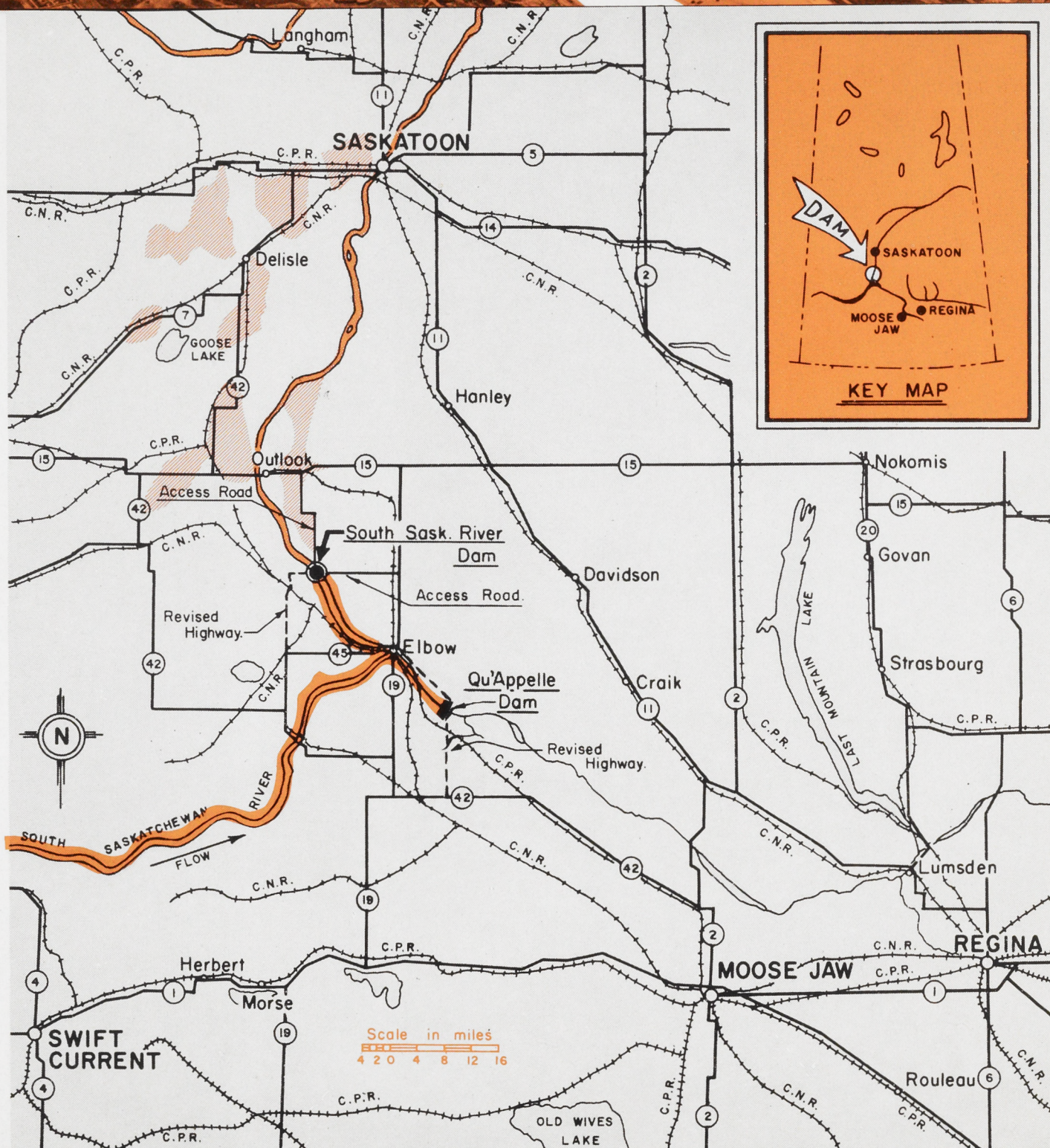
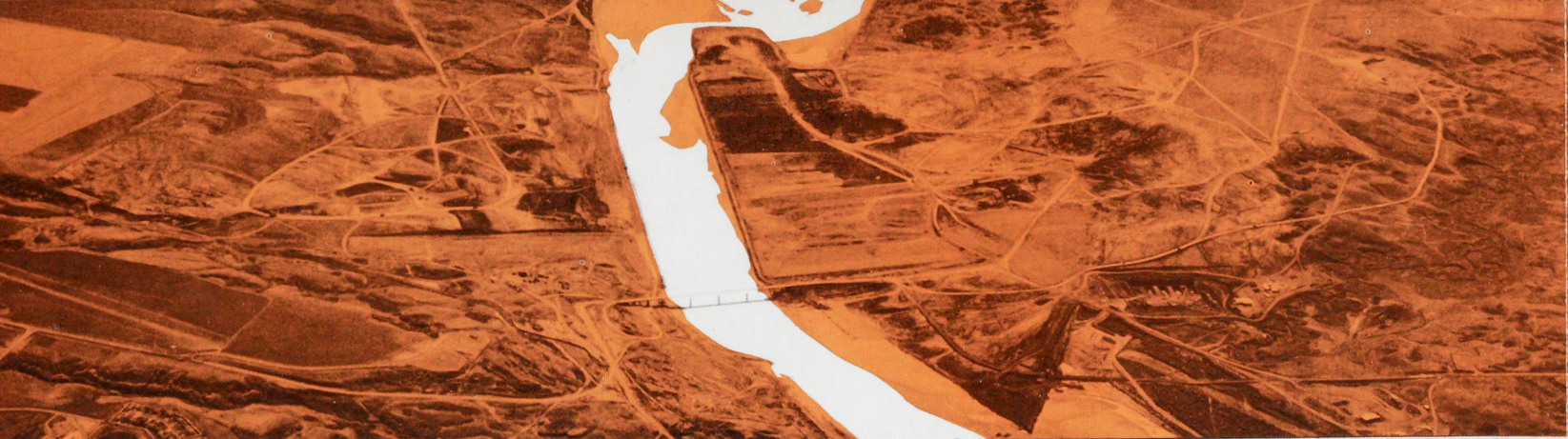


Tractor assists scraper on embankment.



Portal conduits completed, backfilled, and weather bulkheads installed.





TOP: AERIAL VIEW OF CONST. AREA
 BOTTOM: MAP OF DAM AND AREA

PROPOSED RESERVOIR
 PROPOSED IRRIGATED AREA

engineering services

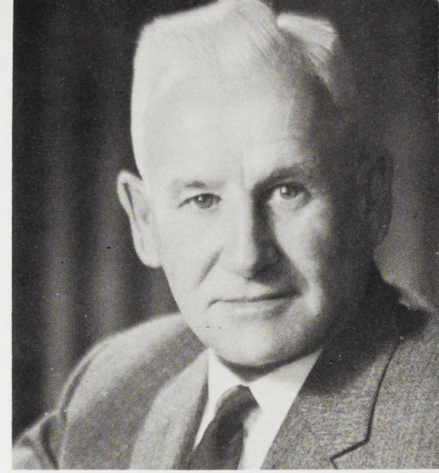
In building a huge structure such as the South Saskatchewan River Dam and allied works, years of investigation and intensive engineering study are required to obtain the information needed to plan and design the project. P.F.R.A. personnel are experienced in performing this work, having constructed other large dams such as the St. Mary Dam on the the St. Mary Irrigation Project, and the Traverse Dam on the Bow River Irrigation Project, both in Alberta. This experience has served P.F.R.A. well in planning the project now being built.

Leadership for those concerned with the construction of the South Saskatchewan River Dam is provided by Gordon L. MacKenzie, Director of the Prairie Farm Rehabilitation Administration.

Chief Engineer for the P.F.R.A. is G. N. Munro, who is responsible for all engineering services provided. J. Gordon Watson, the Assistant Chief Engineer, also serves as Project Engineer. He is responsible for all aspects of engineering, administration and supervision of construction associated with the S.S.R.D. Senior officer in charge of construction at the Damsite is the Construction Engineer, Walter B. Thomson.

The main divisions of the P.F.R.A. organization from an engineering standpoint are the Surveys Division, the Soil Mechanics and Materials Division, the Drainage Division, the Hydrology Division, the Air Photo Analysis and Engineering Geology Division, and the Design Division.

P.F.R.A. personnel at the Dam work on all the various engineering aspects, and perform the major engineering tasks in construction of the Dam.



G. L. MacKENZIE
Director, P.F.R.A.



G. N. MUNRO
Chief Engineer



J. G. WATSON
Project Engineer



W. B. THOMPSON
Construction Engineer



Modern townsite serves employees.

MATERIALS

Among the more important factors in building a structure are the foundations on which it will be built, and the materials that will be used in construction.

The origin and history of the foundations must be studied through surface and subsurface exploration. Material samples must be obtained and processed in laboratories. Two hundred and fifty thousand such samples have been processed at this site. The work is carried out by the Soil Mechanics and Materials Division, along with the Photo Analysis and Geology Division.

DESIGN AND PLANNING

Before construction can proceed, designs must be developed that will accomplish all the purposes of the

project, accommodate the character of the materials available, the river flows, and the foreseeable acts of man and nature.

This work is carried out throughout construction by the Design Division.

LAND DEVELOPMENT

On irrigation projects such as will be developed in the area of the South Saskatchewan River Dam, the classification of lands, determination of irrigation potential, and the implementing of correct irrigation practices are very necessary. On the South Saskatchewan River Project, the Drainage Division is assisting the Province of Saskatchewan in determining the irrigable areas in central Saskatchewan by performing such studies.

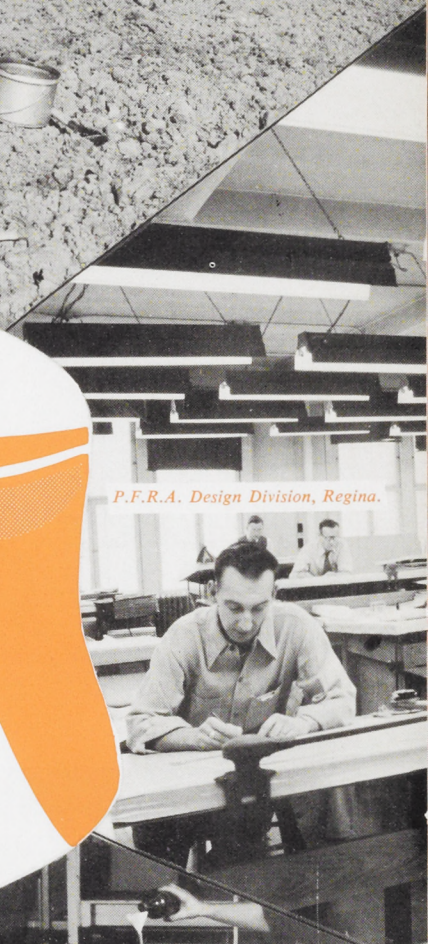
P.F.R.A. Headquarters, Motherwell Building, Regina.



Testing earth samples used in construction.



P.F.R.A. Design Division, Regina.

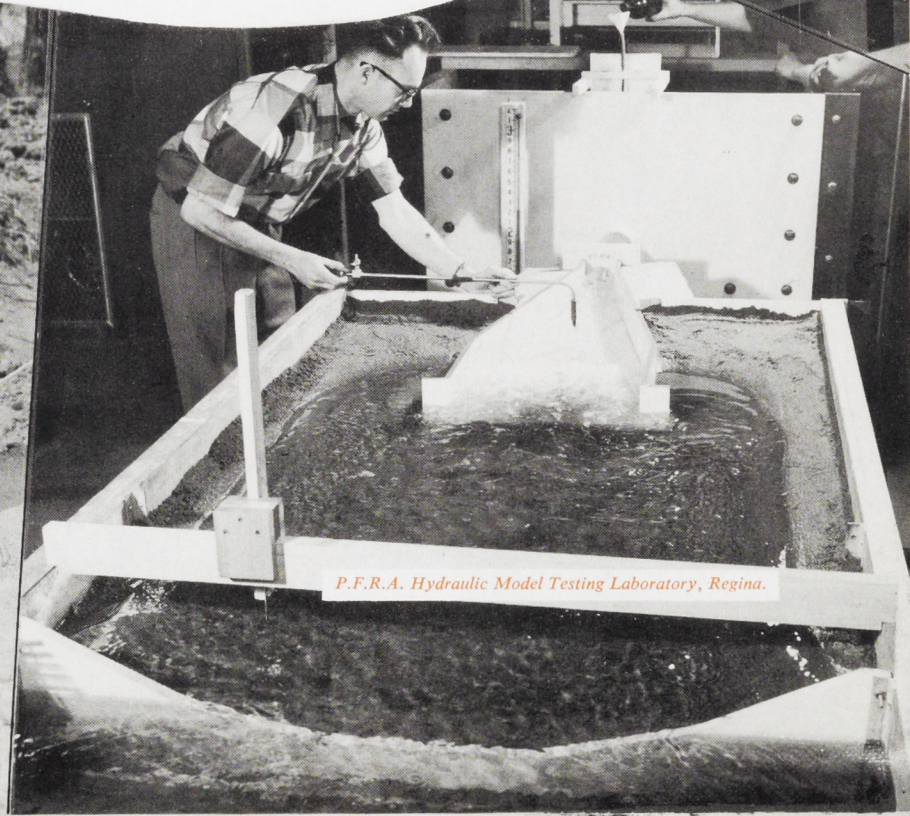


P.F.R.A. Soil Mechanics and Materials Laboratory University of Saskatchewan, Saskatoon.



Concrete mixtures being tested on "concrete farm".

P.F.R.A. Hydraulic Model Testing Laboratory, Regina.

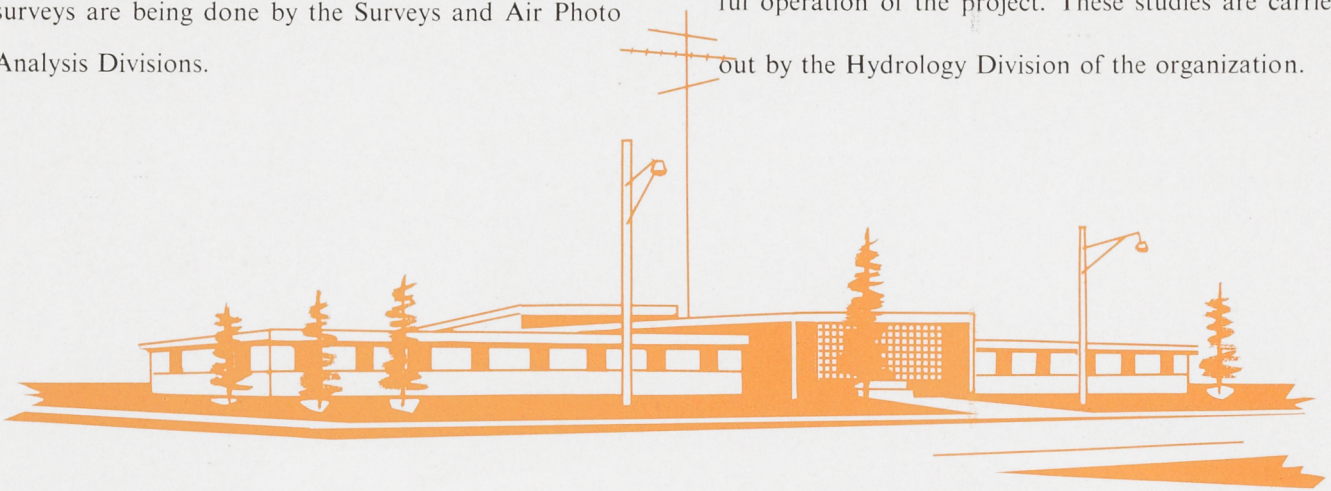


SURVEYS

Basic to all engineering planning is the need of detailed information regarding the physical characteristics of the area involved. Every depression and rise in ground must be measured if the planners are to have a picture of the area with which they are dealing. This is done both by ground and aerial photography surveys. At the South Saskatchewan River Dam, surveying started at the beginning of the project investigation, and will continue throughout the development period. These surveys are being done by the Surveys and Air Photo Analysis Divisions.

WATER

With most P.F.R.A. water conservation projects, the study of watersheds to determine what water supplies are available, their possible uses, and the magnitude of floods which might occur, is basic in the development of the storage works. In the large drainage basin of the South Saskatchewan River, such information is of prime importance in the planning and successful operation of the project. These studies are carried out by the Hydrology Division of the organization.



SOUTH SASKATCHEWAN RIVER DEVELOPMENT BOARD

G. L. MacKenzie, Chairman,
Director, P.F.R.A.

G. N. Munro,
Chief Engineer, P.F.R.A.

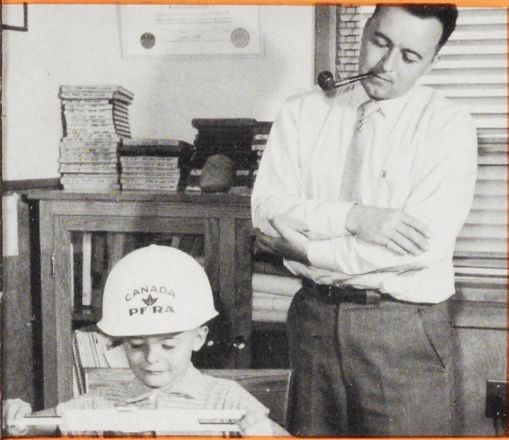
J. G. Watson,
Project Engineer, P.F.R.A.

H. G. Charlton, Regional Administrator,
Canada Department of Finance.

W. H. Horner, Deputy Minister,
Saskatchewan Department of
Agriculture.

T. K. Shoyama, Secretary,
Provincial Economic Advisory &
Planning Board.

David Cass-Beggs, General Manager,
Saskatchewan Power Corporation.



Like father, like son.



Staffhouse cafeteria at townsite.



P.F.R.A. employees' children leaving for school.



Modern shopping area at townsite.

PROJECT STATISTICS

SOUTH SASK. RIVER DAM

Height.....	210 feet
Length—overall.....	16,700 feet
Width at base.....	3,800 feet
Vol. of embankment.....	67,000,000 cu. yds.
Vol. of excavation.....	72,000,000 cu. yds.
Vol. of concrete.....	531,000 cu. yds.
Vol. of rip-rap.....	475,000 cu. yds.
Construction period.....	7 years

SPILLWAY

Type—	Gate controlled concrete chute
Length of chute.....	3,830 feet
Length of crest.....	528 feet
Discharge capacity.....	265,000 c.f.s.

DIVERSION WORKS

Type.....	Tunnels
No. of tunnels.....	5
Average length.....	4,300 feet
Size of tunnels.....	20 ft. dia.

RESERVOIR

Area.....	109,600 acres
Total storage.....	8,000,000 ac. ft.
Usable storage.....	2,750,000 ac. ft.
Length of shoreline.....	475 miles
Length of reservoir.....	140 miles
Depth of water at dam.....	185 feet

QU'APPELLE RIVER DAM

Height.....	90 feet
Length.....	9,000 feet
Width at base.....	700 feet
Vol. of embankment.....	7,500,000 cu. yds.

DRAINAGE BASIN

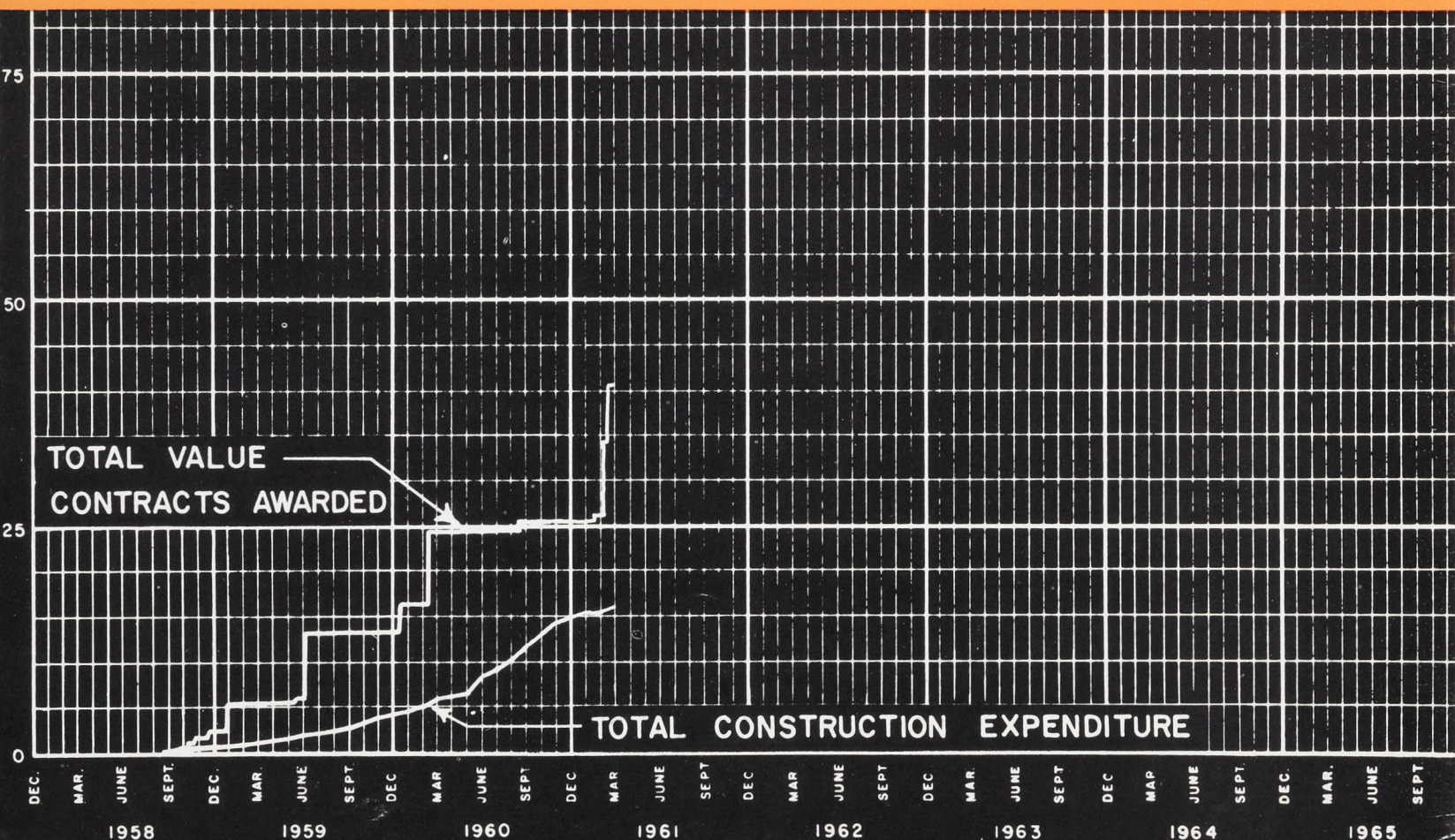
Total for river.....	65,500 sq. mi.
Above damsite.....	48,800 sq. mi.
Irrigable area.....	500,000 acres

POWER

Average annual output.....	475,000,000 kwh.
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PROGRESS BY CONTRACT

* Denotes completed contracts.

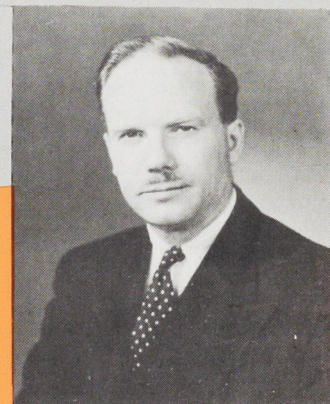


GOVERNMENT OF CANADA

DEPARTMENT OF AGRICULTURE



HON. DOUGLAS S. HARKNESS
Former Minister of Agriculture, Canada



HON. ALVIN HAMILTON
Present Minister of Agriculture, Canada

IN WITNESS WHEREOF the Honourable Douglas Scott Harkness, Minister of Agriculture, has hereunto set his hand on behalf of Canada, and the Honourable Thomas Clement Douglas, Premier, has hereunto set his hand on behalf of the Province.

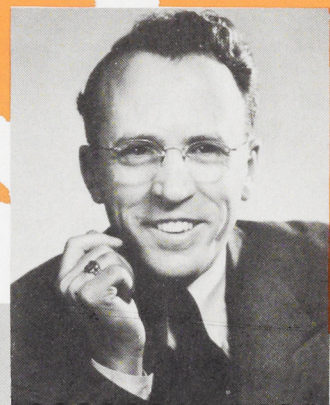
Signed on behalf of Canada by
the Honourable Douglas Scott
Harkness, Minister of Agriculture,
in the presence of

D. S. Harkness
Minister of Agriculture

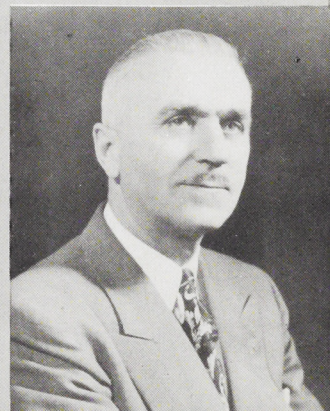
Signed on behalf of the
Province of Saskatchewan by the
Honourable Thomas Clement Douglas,
Premier, in the presence of

T. C. Douglas
Premier

J. E. Nallet



HON. T. C. DOUGLAS
Premier of Saskatchewan



HON. I. C. NOLLET
Minister of Agriculture, Saskatchewan

GOVERNMENT OF THE

PROVINCE OF SASKATCHEWAN

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Canada Department of Agriculture

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